MODELING MANAGERIAL BEHAVIOR BY MANAGERIAL GAMES

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Abstract: *Managerial games are named management simulations (both board or computerized versions) and are devoted to support managerial behavior and solving management problems. Through the simulating the managers learn to work in environment being motivation and experience for them. This article is focused on modeling managerial behavior by managerial games as modern and active form of management courses.*

Key words: Management, managerial behavior, managerial games, simulation, modeling

1 Introduction

We all know the manager's world is growing more complex in the era of globalization. Nowdays technological, social, but also environmental aspects are accelerating. Organizations, industries and government grow ever more tightly coupled. Today's students will have to face more dynamic and more uncertain world than ever before. But managers are not alone in facing such tasks. They must manage their institutions through unpredictable circumstances. System dynamics, including managerial games, models managerial behavior in all spheres of a managerial life.

2 Managerial Games support of managerial behavior

Indeed, it exists a popular metaphor comparing managers and pilots. Managers fly their organizations through uncharted skies and rough weather, all the time monitoring their information systems for sign of trouble, fighting against competition, preventing hijacking. However, there is one difference between managers and pilots. No airline would send a pilot up in a real jumbo jet without extensive training in the simulator. Nonetheless there is expected that managers will fly the organizations building on management school and perhaps even some experience as a junior crew.
Because of these challenges there was necessary to develop "management flight simulators".. Simulations represent cognitive lessons for managers that they compress time and space so that they may experience the long-term consequences of their actions.

3 The Stock Management Problem

One of the most common dynamic decision-making challenges for managers is to regulate the stocks in a quantity. Stocks cannot be controlled directly but rather must be influenced by changes in their inflow and outflow. Typically, managers must set the inflow so as to stabilize losses and usage and to couteract disturbances which push the stock away from desired value. Stock management problems inhere in many levels of aggregation and are also solved in the beer game.

4 The Beer Game – historical development and basic information

The Beer Game dates to the earliest days of system dynamics. It was developed at MIT´s Sloan School of Management in the early 1960s as a part of research on industrial dynamics. The game has been played all over the world by thousands of people within the range from university students to chief executive officers and government officials. The game has been used for more than 30 years as an introduction to systems thinking, dynamics, computer simulation, IT support and management.

The Beer Game is one of a number of a role-playing simulation of an industrial production and distribution. The substance of the game is very close to distribution logistics, because of playing roles of producer or factory (in this case brewery), distributor, wholesaler, retailer and customer, who is a linear distribution chain built by.

The Beer Game means something like as competition of breweries. The game can be played in board version (the computerized one will be also available). The board is divided into four coloured sectors (red – producer, green – distributor, blue – wholesaler and black – retailer) for better orientation. Maximum three persons are permited for one position. Small red chips stand for cases of beer. A deck of cards represents customer requirements on an order.

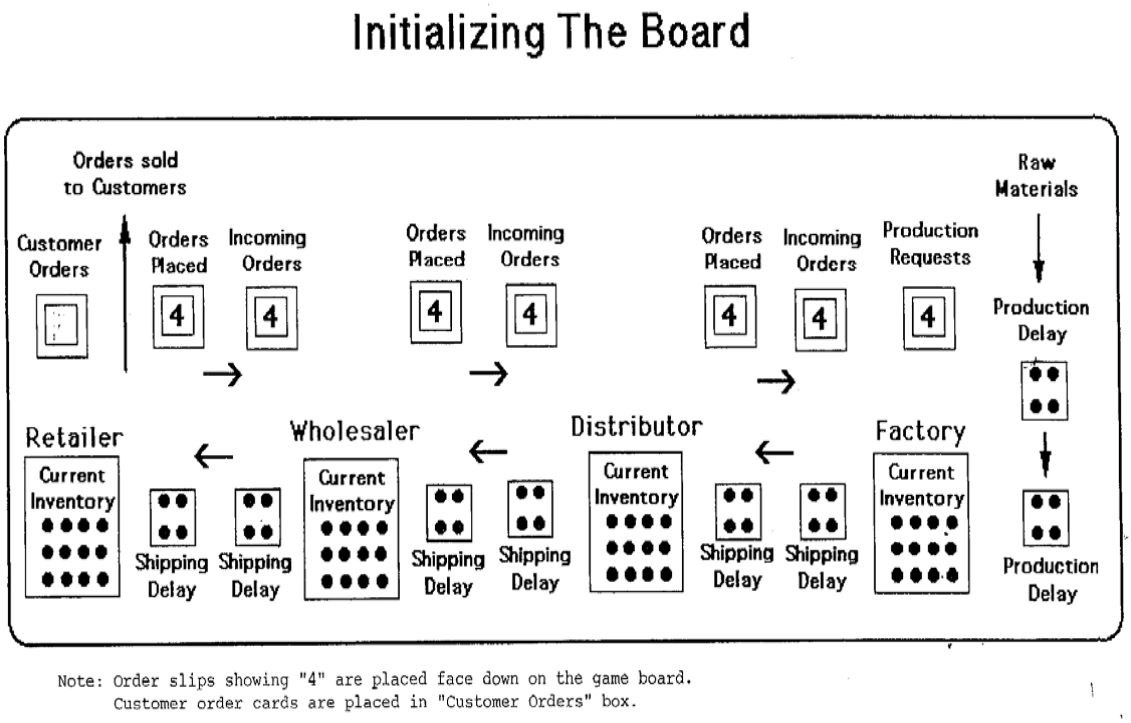

Fig. 1: Linear Distribution Chain

Source: STERMAN, JOHN D. Instructions for Running the Production-Distribution Game "The Beer Game".

Each simulated period (most usually in the duration of a week), customers purchase a certain number of goods from the retailer, who ships the beer requested out of his inventory. The retailer in turn orders from the wholesaler, the wholesaler from the distributor, the distributor from the producer. The producer must set his requests for production in the factory. At each stage both shipping and production (processing) delays are working.

Each player has good local information but quite limited global information. Players keep files of their inventory, backlog and orders placed with their supplier each week. See figure displaying the example of record sheet in the chapter "Results – case study".

Course of the Beer Game

However players are directed not to communicate among each other, information is passed through orders and shipments. Customer demand is not known to any of the players in advance. Only the retailers find out customer demand as the game proceeds. The others players learn only what their own customer orders.

These limitations of information imply that the players are incapable to coordinate their decisions or plan together the strategy, even though the aim of each team is to minimize total costs. As in many real life settings, the global optimization problem must be divided into sub problems distributed through-out the organization.

The game is deceptively simple confronted to real life. All that players have to do is meet customer demand and order enough from supplier to keep inventory low while avoiding costly backlogs. There are no machine breakdowns, labor problems, capacity limits or financial constraints. In spite of the results are shocking.

Lessons of the game

The emotions increase during the game. A lot of players report feeling of fecklessness and some of them blame their teammates for their problems. After the game we should ask the players to sketch their best estimate of the pattern of customer demand. Only the retailers have direct knowledge of that demand. The large majority regularly draw a fluctuating pattern for customer demand, rising from the initial rate of four to a peak around twenty cases per week, and then plunging.

Most players do not account for the impact of their own decisions on their teammates and on the whole system. Especially, they have great difficulty appreciating the multiply feedback loops and time delays. When customer orders increase unawares, retail inventory fall, since the shipment delays mean deliveries continue for several weeks at the old, lower rate. Faced with an increasing backlog, players must order more than demand, often trying to solve the problem by placing vast orders. If there were no time delays, this strategy would behave well. But in the game, these huge orders stock out the wholesaler. Retailers don`t receive the beer they ordered, and grow more and more anxious as their backlog becomes worse, guiding them to order still more, although the supply chain contains more than enough.

Under pressure, the players focus on managing their own piece of the system, trying to keep own costs low. And when the long-term effect of short-sighted actions hit home, they blame customer for ordering erratically, and supplier for delivering late. Especially, people have great difficulty appreciating the multiply feedback loops.

5 Using the Beer Game

The bear game is especially useful in lessons of operational management, planning of production and related questions. The game emphasizes the importance of coordination among particular levels in organizations, the role of information in controlling complex systems and the effects of different production approaches such as just-in-time inventory management. Nevertheless the game clarifies more general issues as well. The game creates a real organization, with teams that have to work together. However the pressures of situations quickly cause team consistency break down. That is the reason why the game is often played as a team building experience at all levels of management. To summarize we can say that game provides an inspirational experience with a complex system, where players can see connection between structure of a system and how the collective results of individually sensible decision can be unfortunate.

6 Conclusions

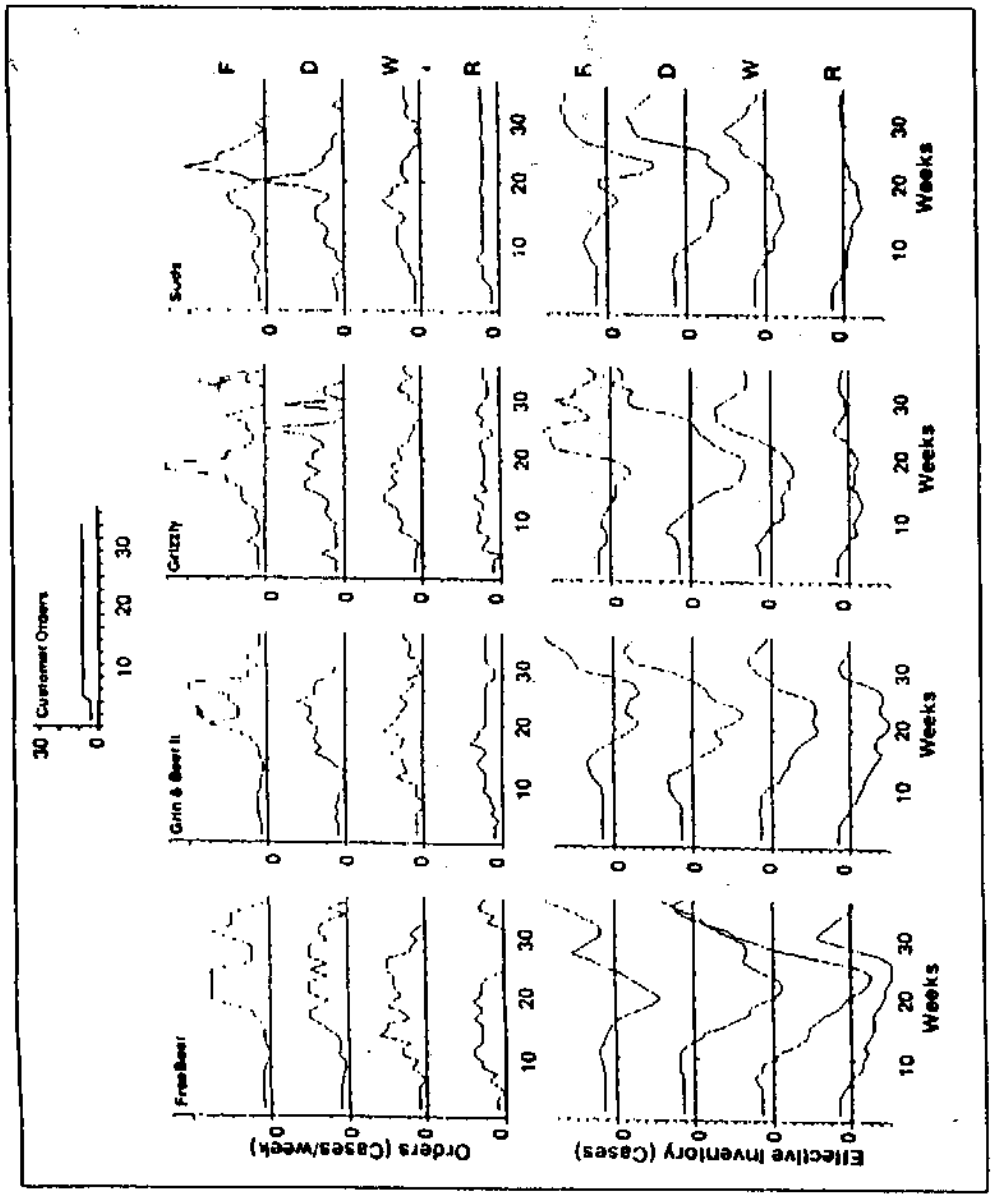

Figure 2: Typical Beer Game results. Top: orders; bottom: inventory (negative values denote backlogs). From bottom to top: Retailer, Wholesaler, Distributor, Factory. Tick marks denote 10 cases of beer. Compare the oscillations to the small step in customer orders.

Fig. 2: Typical Beer Game results

Source: STERMAN, JOHN D. *Modeling Managerial Behavior: Misperceptions of Feedback in a Dynamic Decision Making Experiment.*

The keynote of the game is to minimize total costs of a team. Costs attitude is important for this game, not profitability. Costs are divided into inventory holding and backlog category. Inventory holding costs are fifty units for case per week. Backlog costs are one hundred units for case per week. But shipping or transport costs are not involved at all. Total costs are agregated across all positions in each team (linear distribution chain).

Case study

Tab. 1: Case study

Team Name: ***Pilsner Brewery***
Positions: ☐ Retailer ☐ Wholesaler ☐ ***Distributor*** ☐ Factory

Period	***Inventory***	***Backlog***	***Requirement***
1	12	0	4
2	12	0	4
3	12	0	8
4	12	0	8
5	9	0	10
6	7	0	10
7	8	0	15
8	9	0	17
9	13	0	17
10	16	0	10
Results	110 x 0,5 +	0 x 1 =	55

Source: own research (March 2006)

The figure on previous page shows an ideal case: backlogs equal 0 and so there are no additional costs for distributor. But to stay in equilibrium within the whole course of the game is a very demanding task of this game.

Reference:

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